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SEQUENCE LISTING

<110> Nihon Nohyaku Co., Ltd.

<120> NOVEL PROTOPORPHYRINOGEN OXIDASE TOLERANT TO PHOTOBLEACHING HERBICIDE

<130> Q58140

<140> 09/508,418

<141> 2000-03-13

<150> JP 9-265084

<151> 1997-09-11

<160> 11

<170> PatentIn version 3.0

<210> 1

<211> 1874

<212> DNA

<213> Nicotiana tabacum

<220>

<221> exon

<222> (26)..(1672)

<220>

<221> misc_feature

<223> Strain name: Xanthi NC

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cct	aat	att	ttc	act	cac	cag	tcg	tcg	tca	tcg	cca	ttg	gca	ttc	tta	100
Pro	Asn	Ile	Phe	Thr	His	Gln	Ser	Ser	Ser	Ser	Pro	Leu	Ala	Phe	Leu	
10					15				20					25		
aac	cgt	acg	agt	ttc	atc	cct	ttc	tct	tca	atc	tcc	aag	cgc	aat	agt	148
Asn	Arg	Thr	Ser	Phe	Ile	Pro	Phe	Ser	Ser	Ile	Ser	Lys	Arg	Asn	Ser	
				30				35						40		
gtc	aat	tgc	aat	ggc	tgg	aga	aca	cga	tgc	tcc	gtt	gcc	aaa	gat	tac	196
Val	Asn	Cys	Asn	Gly	Trp	Arg	Thr	Arg	Cys	Ser	Val	Ala	Lys	Asp	Tyr	
			45					50					55			
aca	gtt	cct	tcc	tca	gcg	gtc	gac	ggc	gga	ccc	gcc	gcg	gag	ctg	gac	244
Thr	Val	Pro	Ser	Ser	Ala	Val	Asp	Gly	Gly	Pro	Ala	Ala	Glu	Leu	Asp	
		60					65					70				
tgt	gtt	ata	gtt	gga	gca	gga	att	agt	ggc	ctc	tgc	att	gcg	cag	gtg	292
Cys	Val	Ile	Val	Gly	Ala	Gly	Ile	Ser	Gly	Leu	Cys	Ile	Ala	Gln	Val	

75	80	85	
atg tcc gct aat tac ccc aat ttg atg gta acc gag gcg aga gat cgt Met Ser Ala Asn Tyr Pro Asn Leu Met Val Thr Glu Ala Arg Asp Arg 90 95 100 105			340
gcc ggt ggc aac ata acg act gtg gaa aga gac ggc tat ttg tgg gaa Ala Gly Gly Asn Ile Thr Thr Val Glu Arg Asp Gly Tyr Leu Trp Glu 110 115 120			388
gaa ggt ccc aac agt ttc cag ccg tcc gat cct atg ttg act atg gca Glu Gly Pro Asn Ser Phe Gln Pro Ser Asp Pro Met Leu Thr Met Ala 125 130 135			436
gta gat tgt gga ttg aag gat gat ttg gtg ttg gga gat cct aat gcg Val Asp Cys Gly Leu Lys Asp Asp Leu Val Leu Gly Asp Pro Asn Ala 140 145 150			484
ccc cgt ttc gtt ttg tgg aag ggt aaa tta agg ccc gtc ccc tca aaa Pro Arg Phe Val Leu Trp Lys Gly Lys Leu Arg Pro Val Pro Ser Lys 155 160 165			532
ctc act gat ctt ccc ttt ttt gat ttg atg agc att cct ggc aag ttg Leu Thr Asp Leu Pro Phe Phe Asp Leu Met Ser Ile Pro Gly Lys Leu 170 175 180 185			580
aga gct ggt ttt ggt ccc att ggc ctc cgc cct tca cct cca ggt cat Arg Ala Gly Phe Gly Pro Ile Gly Leu Arg Pro Ser Pro Pro Gly His 190 195 200			628
gag gaa tca gtt gag cag ttc gtg cgt cgt aat ctt ggt ggc gaa gtc Glu Glu Ser Val Glu Gln Phe Val Arg Arg Asn Leu Gly Gly Glu Val 205 210 215			676
ttt gaa cgc ttg ata gaa cca ttt tgt tct ggt gtt tat gct ggt gat Phe Glu Arg Leu Ile Glu Pro Phe Cys Ser Gly Val Tyr Ala Gly Asp 220 225 230			724
ccc tca aaa ctg agt atg aaa gca gca ttt ggg aaa gtt tgg aag ttg Pro Ser Lys Leu Ser Met Lys Ala Ala Phe Gly Lys Val Trp Lys Leu 235 240 245			772
gaa gaa act ggt ggt agc att att gga gga acc ttt aaa gca ata aag Glu Glu Thr Gly Gly Ser Ile Ile Gly Gly Thr Phe Lys Ala Ile Lys 250 255 260 265			820
gag aga tcc agt aca cct aaa gcg ccc cgc gat ccg cgt tta cct aaa Glu Arg Ser Ser Thr Pro Lys Ala Pro Arg Asp Pro Arg Leu Pro Lys 270 275 280			868
cca aaa gga cag aca gtt gga tca ttc agg aag ggt ctc aga atg ctg Pro Lys Gly Gln Thr Val Gly Ser Phe Arg Lys Gly Leu Arg Met Leu 285 290 295			916
ccg gat gca atc agt gca aga ttg gga agc aaa tta aaa cta tca tgg			964

Pro Asp Ala Ile Ser Ala Arg Leu Gly Ser Lys Leu Lys Leu Ser Trp	
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aag ctt tct agc att act aag tca gaa aaa gga gga tat cac ttg aca	1012
Lys Leu Ser Ser Ile Thr Lys Ser Glu Lys Gly Gly Tyr His Leu Thr	
315 320 325	
tac gag aca cca gaa gga gta gtt tct ctt caa agt cga agc att gtc	1060
Tyr Glu Thr Pro Glu Gly Val Val Ser Leu Gln Ser Arg Ser Ile Val	
330 335 340 345	
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Met Thr Val Pro Ser Tyr Val Ala Ser Asn Ile Leu Arg Pro Leu Ser	
350 355 360	
gtt gcc gca gca gat gca ctt tca aat ttc tac tat ccc cca gtt gga	1156
Val Ala Ala Ala Asp Ala Leu Ser Asn Phe Tyr Tyr Pro Pro Val Gly	
365 370 375	
gca gtc aca att tca tat cct caa gaa gct att cgt gat gag cgt ctg	1204
Ala Val Thr Ile Ser Tyr Pro Gln Glu Ala Ile Arg Asp Glu Arg Leu	
380 385 390	
gtt gat ggt gaa cta aag gga ttt ggg cag ttg cat cca cgt aca cag	1252
Val Asp Gly Glu Leu Lys Gly Phe Gly Gln Leu His Pro Arg Thr Gln	
395 400 405	
gga gtg gaa aca cta gga acg ata tat agt tca tca ctc ttc cct aac	1300
Gly Val Glu Thr Leu Gly Thr Ile Tyr Ser Ser Ser Leu Phe Pro Asn	
410 415 420 425	
cgt gcc cca aaa ggt cgg gtg cta ctc ttg aac tac att gga gga gca	1348
Arg Ala Pro Lys Gly Arg Val Leu Leu Leu Asn Tyr Ile Gly Gly Ala	
430 435 440	
aaa aat cct gaa att ttg tct aag acg gag agc caa ctt gtg gaa gta	1396
Lys Asn Pro Glu Ile Leu Ser Lys Thr Glu Ser Gln Leu Val Glu Val	
445 450 455	
gtt gat cgt gac ctc aga aaa atg ctt ata aaa ccc aaa gct caa gat	1444
Val Asp Arg Asp Leu Arg Lys Met Leu Ile Lys Pro Lys Ala Gln Asp	
460 465 470	
cct ctt gtt gtg ggt gtg cga gta tgg cca caa gct atc cca cag ttt	1492
Pro Leu Val Val Gly Val Arg Val Trp Pro Gln Ala Ile Pro Gln Phe	
475 480 485	
ttg gtt ggt cat ctg gat acg cta agt act gca aaa gct gct atg aat	1540
Leu Val Gly His Leu Asp Thr Leu Ser Thr Ala Lys Ala Ala Met Asn	
490 495 500 505	
gat aat ggg ctt gaa ggg ctg ttt ctt ggg ggt aat tat gtg tca ggt	1588
Asp Asn Gly Leu Glu Gly Leu Phe Leu Gly Gly Asn Tyr Val Ser Gly	
510 515 520	

gta gca ttg ggg agg tgt gtt gaa ggt gct tat gaa gtt gca tcc gag 1636
 Val Ala Leu Gly Arg Cys Val Glu Gly Ala Tyr Glu Val Ala Ser Glu
 525 530 535
 gta aca gga ttt ctg tct cgg tat gca tac aaa tga aacctgtgtt 1682
 Val Thr Gly Phe Leu Ser Arg Tyr Ala Tyr Lys
 540 545
 gggggtagtc caaaccttgt tagtagtacg atcatgcctt gggaaaattg gcatgtgcct 1742
 aaaagttttg ctcatagag ttatttttagc cttggtaa at gatttgtact tgatatcagt 1802
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 <212> PRT
 <213> Nicotiana tabacum

<220>
 <221> misc_feature
 <223> Strain name: SR1

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 35 40 45
 Thr Arg Cys Ser Val Ala Lys Asp Tyr Thr Val Pro Ser Ser Ala Val
 50 55 60
 Asp Gly Gly Pro Ala Ala Glu Leu Asp Cys Val Ile Val Gly Ala Gly
 65 70 75 80
 Ile Ser Gly Leu Cys Ile Ala Gln Val Met Ser Ala Asn Tyr Pro Asn
 85 90 95
 Leu Met Val Thr Glu Ala Arg Asp Arg Ala Gly Gly Asn Ile Thr Thr
 100 105 110
 Val Glu Arg Asp Gly Tyr Leu Trp Glu Glu Gly Pro Asn Ser Phe Gln
 115 120 125
 Pro Ser Asp Pro Met Leu Thr Met Ala Val Asp Cys Gly Leu Lys Asp
 130 135 140

Asp Leu Val Leu Gly Asp Pro Asn Ala Pro Arg Phe Val Leu Trp Lys
 145 150 155 160
 Gly Lys Leu Arg Pro Val Pro Ser Lys Leu Thr Asp Leu Pro Phe Phe
 165 170 175
 Asp Leu Met Ser Ile Pro Gly Lys Leu Arg Ala Gly Phe Gly Pro Ile
 180 185 190
 Gly Leu Arg Pro Ser Pro Pro Gly His Glu Glu Ser Val Glu Gln Phe
 195 200 205
 Val Arg Arg Asn Leu Gly Gly Glu Val Phe Glu Arg Leu Ile Glu Pro
 210 215 220
 Phe Cys Ser Gly Val Tyr Val Gly Asp Pro Ser Lys Leu Ser Met Lys
 225 230 235 240
 Ala Ala Phe Gly Lys Val Trp Lys Leu Glu Glu Thr Gly Gly Ser Ile
 245 250 255
 Ile Gly Gly Thr Phe Lys Ala Ile Lys Glu Arg Ser Ser Thr Pro Lys
 260 265 270
 Ala Pro Arg Asp Pro Arg Leu Pro Lys Pro Lys Gly Gln Thr Val Gly
 275 280 285
 Ser Phe Arg Lys Gly Leu Arg Met Leu Pro Asp Ala Ile Ser Ala Arg
 290 295 300
 Leu Gly Ser Lys Leu Lys Leu Ser Trp Lys Leu Ser Ser Ile Thr Lys
 305 310 315 320
 Ser Glu Lys Gly Gly Tyr His Leu Thr Tyr Glu Thr Pro Glu Gly Val
 325 330 335
 Val Ser Leu Gln Ser Arg Ser Ile Val Met Thr Val Pro Ser Tyr Val
 340 345 350
 Ala Ser Asn Ile Leu Arg Pro Leu Ser Val Ala Ala Ala Asp Ala Leu
 355 360 365
 Ser Asn Phe Tyr Tyr Pro Pro Val Gly Ala Val Thr Ile Ser Tyr Pro
 370 375 380
 Gln Glu Ala Ile Arg Asp Glu Arg Leu Val Asp Gly Glu Leu Lys Gly
 385 390 395 400
 Phe Gly Gln Leu His Pro Arg Thr Gln Gly Val Glu Thr Leu Gly Thr
 405 410 415
 Ile Tyr Ser Ser Ser Leu Phe Pro Asn Arg Ala Pro Lys Gly Arg Val
 420 425 430

Leu Leu Leu Asn Tyr Ile Gly Gly Ala Lys Asn Pro Glu Ile Leu Ser
 435 440 445
 Lys Thr Glu Ser Gln Leu Val Glu Val Val Asp Arg Asp Leu Arg Lys
 450 455 460
 Met Leu Ile Lys Pro Lys Ala Gln Asp Pro Leu Val Val Gly Val Arg
 465 470 475 480
 Val Trp Pro Gln Ala Ile Pro Gln Phe Leu Val Gly His Leu Asp Thr
 485 490 495
 Leu Ser Thr Ala Lys Ala Ala Met Asn Asp Asn Gly Leu Glu Gly Leu
 500 505 510
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 515 520 525
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 530 535 540
 Tyr Ala Tyr Lys
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<210> 3
 <211> 1874
 <212> DNA
 <213> Nicotiana tabacum

<220>
 <221> exon
 <222> (26)..(1672)

<220>
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 <223> Strain name: SR1

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 Pro Asn Ile Phe Thr His Gln Ser Ser Ser Ser Pro Leu Ala Phe Leu
 10 15 20 25
 aac cgt acg agt ttc atc cct ttc tct tca atc tcc aag cgc aat agt 148
 Asn Arg Thr Ser Phe Ile Pro Phe Ser Ser Ile Ser Lys Arg Asn Ser
 30 35 40
 gtc aat tgc aat ggc tgg aga aca cga tgc tcc gtt gcc aaa gat tac 196
 Val Asn Cys Asn Gly Trp Arg Thr Arg Cys Ser Val Ala Lys Asp Tyr
 45 50 55

aca gtt cct tcc tca gcg gtc gac ggc gga ccc gcc gcg gag ctg gac	244
Thr Val Pro Ser Ser Ala Val Asp Gly Gly Pro Ala Ala Glu Leu Asp	
60 65 70	
tgt gtt ata gtt gga gca gga att agt ggc ctc tgc att gcg cag gtg	292
Cys Val Ile Val Gly Ala Gly Ile Ser Gly Leu Cys Ile Ala Gln Val	
75 80 85	
atg tcc gct aat tac ccc aat ttg atg gta acc gag gcg aga gat cgt	340
Met Ser Ala Asn Tyr Pro Asn Leu Met Val Thr Glu Ala Arg Asp Arg	
90 95 100 105	
gcc ggt ggc aac ata acg act gtg gaa aga gac ggc tat ttg tgg gaa	388
Ala Gly Gly Asn Ile Thr Thr Val Glu Arg Asp Gly Tyr Leu Trp Glu	
110 115 120	
gaa ggt ccc aac agt ttc cag ccg tcc gat cct atg ttg act atg gca	436
Glu Gly Pro Asn Ser Phe Gln Pro Ser Asp Pro Met Leu Thr Met Ala	
125 130 135	
gta gat tgt gga ttg aag gat gat ttg gtg ttg gga gat cct aat gcg	484
Val Asp Cys Gly Leu Lys Asp Asp Leu Val Leu Gly Asp Pro Asn Ala	
140 145 150	
ccc cgt ttc gtt ttg tgg aag ggt aaa tta agg ccc gtc ccc tca aaa	532
Pro Arg Phe Val Leu Trp Lys Gly Lys Leu Arg Pro Val Pro Ser Lys	
155 160 165	
ctc act gat ctt ccc ttt ttt gat ttg atg agc att cct ggc aag ttg	580
Leu Thr Asp Leu Pro Phe Phe Asp Leu Met Ser Ile Pro Gly Lys Leu	
170 175 180 185	
aga gct ggt ttt ggt gcc att ggc ctc cgc cct tca cct cca ggt cat	628
Arg Ala Gly Phe Gly Ala Ile Gly Leu Arg Pro Ser Pro Pro Gly His	
190 195 200	
gag gaa tca gtt gag cag ttc gtg cgt cgt aat ctt ggt ggc gaa gtc	676
Glu Glu Ser Val Glu Gln Phe Val Arg Arg Asn Leu Gly Gly Glu Val	
205 210 215	
ttt gaa cgc ttg ata gaa cca ttt tgt tct ggt gtt tat gtt ggt gat	724
Phe Glu Arg Leu Ile Glu Pro Phe Cys Ser Gly Val Tyr Val Gly Asp	
220 225 230	
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Pro Ser Lys Leu Ser Met Lys Ala Ala Phe Gly Lys Val Trp Lys Leu	
235 240 245	
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Glu Glu Thr Gly Gly Ser Ile Ile Gly Gly Thr Phe Lys Ala Ile Lys	
250 255 260 265	
gag aga tcc agt aca cct aaa gcg ccc cgc gat ccg cgt tta cct aaa	868
Glu Arg Ser Ser Thr Pro Lys Ala Pro Arg Asp Pro Arg Leu Pro Lys	
270 275 280	

cca aaa gga cag aca gtt gga tca ttc agg aag ggt ctc aga atg ctg	916
Pro Lys Gly Gln Thr Val Gly Ser Phe Arg Lys Gly Leu Arg Met Leu	
285 290 295	
ccg gat gca atc agt gca aga ttg gga agc aaa tta aaa cta tca tgg	964
Pro Asp Ala Ile Ser Ala Arg Leu Gly Ser Lys Leu Lys Leu Ser Trp	
300 305 310	
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Lys Leu Ser Ser Ile Thr Lys Ser Glu Lys Gly Gly Tyr His Leu Thr	
315 320 325	
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330 335 340 345	
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Met Thr Val Pro Ser Tyr Val Ala Ser Asn Ile Leu Arg Pro Leu Ser	
350 355 360	
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Val Ala Ala Ala Asp Ala Leu Ser Asn Phe Tyr Tyr Pro Pro Val Gly	
365 370 375	
gca gtc aca att tca tat cct caa gaa gct att cgt gat gag cgt ctg	1204
Ala Val Thr Ile Ser Tyr Pro Gln Glu Ala Ile Arg Asp Glu Arg Leu	
380 385 390	
gtt gat ggt gaa cta aag gga ttt ggg cag ttg cat cca cgt aca cag	1252
Val Asp Gly Glu Leu Lys Gly Phe Gly Gln Leu His Pro Arg Thr Gln	
395 400 405	
gga gtg gaa aca cta gga acg ata tat agt tca tca ctc ttc cct aac	1300
Gly Val Glu Thr Leu Gly Thr Ile Tyr Ser Ser Ser Leu Phe Pro Asn	
410 415 420 425	
cgt gcc cca aaa ggt cgg gtg cta ctc ttg aac tac att gga gga gca	1348
Arg Ala Pro Lys Gly Arg Val Leu Leu Leu Asn Tyr Ile Gly Gly Ala	
430 435 440	
aaa aat cct gaa att ttg tct aag acg gag agc caa ctt gtg gaa gta	1396
Lys Asn Pro Glu Ile Leu Ser Lys Thr Glu Ser Gln Leu Val Glu Val	
445 450 455	
gtt gat cgt gac ctc aga aaa atg ctt ata aaa ccc aaa gct caa gat	1444
Val Asp Arg Asp Leu Arg Lys Met Leu Ile Lys Pro Lys Ala Gln Asp	
460 465 470	
cct ctt gtt gtg ggt gtg cga gta tgg cca caa gct atc cca cag ttt	1492
Pro Leu Val Val Gly Val Arg Val Trp Pro Gln Ala Ile Pro Gln Phe	
475 480 485	
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Leu Val Gly His Leu Asp Thr Leu Ser Thr Ala Lys Ala Ala Met Asn	

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gat aat ggg ctt gaa ggg ctg ttt ctt ggg ggt aat tat gtg tca ggt				1588
Asp Asn Gly Leu Glu Gly Leu Phe Leu Gly Gly Asn Tyr Val Ser Gly				
	510	515	520	
gta gca ttg ggg agg tgt gtt gaa ggt gct tat gaa gtt gca tcc gag				1636
Val Ala Leu Gly Arg Cys Val Glu Gly Ala Tyr Glu Val Ala Ser Glu				
	525	530	535	
gta aca gga ttt ctg tct cgg tat gca tac aaa tga aacctgtgtt				1682
Val Thr Gly Phe Leu Ser Arg Tyr Ala Tyr Lys				
	540	545		
gggggtagtc caaaccttgt tagtagtacg atcatgcctt gggaaaattg gcatgtgcct				1742
aaaagttttg ctccattagag ttatttttagc cttggtaaatt gatttgtact tgatatcagt				1802
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			20					25					30			
Arg	Cys	Ser	Val	Ala	Gly	Gly	Pro	Thr	Val	Gly	Ser	Ser	Lys	Ile	Glu	
		35					40					45				
Gly	Gly	Gly	Gly	Thr	Thr	Ile	Thr	Thr	Asp	Cys	Val	Ile	Val	Gly	Gly	
	50					55					60					
Gly	Ile	Ser	Gly	Leu	Cys	Ile	Ala	Gln	Ala	Leu	Ala	Thr	Lys	His	Pro	
65					70				75						80	
Asp	Ala	Ala	Pro	Asn	Leu	Ile	Val	Thr	Glu	Ala	Lys	Asp	Arg	Val	Gly	
				85					90					95		
Gly	Asn	Ile	Ile	Thr	Arg	Glu	Glu	Asn	Gly	Phe	Leu	Trp	Glu	Glu	Gly	
		100						105					110			
Pro	Asn	Ser	Phe	Gln	Pro	Ser	Asp	Pro	Met	Leu	Thr	Met	Val	Val	Asp	
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Ser	Gly	Leu	Lys	Asp	Asp	Leu	Val	Leu	Gly	Asp	Pro	Thr	Ala	Pro	Arg	
	130					135					140					
Phe	Val	Leu	Trp	Asn	Gly	Lys	Leu	Arg	Pro	Val	Pro	Ser	Lys	Leu	Thr	
145					150					155					160	
Asp	Leu	Pro	Phe	Phe	Asp	Leu	Met	Ser	Ile	Gly	Gly	Lys	Ile	Arg	Ala	
				165					170					175		
Gly	Phe	Gly	Ala	Leu	Gly	Ile	Arg	Pro	Ser	Pro	Pro	Gly	Arg	Glu	Glu	
		180						185					190			
Ser	Val	Glu	Glu	Phe	Val	Arg	Arg	Asn	Leu	Gly	Asp	Glu	Val	Phe	Glu	
		195					200					205				
Arg	Leu	Ile	Glu	Pro	Phe	Cys	Ser	Gly	Val	Tyr	Ala	Gly	Asp	Pro	Ser	
	210					215					220					
Lys	Leu	Ser	Met	Lys	Ala	Ala	Phe	Gly	Lys	Val	Trp	Lys	Leu	Glu	Gln	
225					230					235					240	
Asn	Gly	Gly	Ser	Ile	Ile	Gly	Gly	Thr	Phe	Lys	Ala	Ile	Gln	Glu	Arg	
			245					250					255			
Lys	Asn	Ala	Pro	Lys	Ala	Glu	Arg	Asp	Pro	Arg	Leu	Pro	Lys	Pro	Gln	
			260					265					270			

Gly Gln Thr Val Gly Ser Phe Arg Lys Gly Leu Arg Met Leu Pro Glu
 275 280 285

Ala Ile Ser Ala Arg Leu Gly Ser Lys Val Lys Leu Ser Trp Lys Leu
 290 295 300

Ser Gly Ile Thr Lys Leu Glu Ser Gly Gly Tyr Asn Leu Thr Tyr Glu
 305 310 315 320

Thr Pro Asp Gly Leu Val Ser Val Gln Ser Lys Ser Val Val Met Thr
 325 330 335

Val Pro Ser His Val Ala Ser Gly Leu Leu Arg Pro Leu Ser Glu Ser
 340 345 350

Ala Ala Asn Ala Leu Ser Lys Leu Tyr Tyr Pro Pro Val Ala Ala Val
 355 360 365

Ser Ile Ser Tyr Pro Lys Glu Ala Ile Arg Thr Glu Cys Leu Ile Asp
 370 375 380

Gly Glu Leu Lys Gly Phe Gly Gln Leu His Pro Arg Thr Gln Gly Val
 385 390 395 400

Glu Thr Leu Gly Thr Ile Tyr Ser Ser Ser Leu Phe Pro Asn Arg Ala
 405 410 415

Pro Pro Gly Arg Ile Leu Leu Leu Asn Tyr Ile Gly Gly Ser Thr Asn
 420 425 430

Thr Gly Ile Leu Ser Lys Ser Glu Gly Glu Leu Val Glu Ala Val Asp
 435 440 445

Arg Asp Leu Arg Lys Met Leu Ile Lys Pro Asn Ser Thr Asp Pro Leu
 450 455 460

Lys Leu Gly Val Arg Val Trp Pro Gln Ala Ile Pro Gln Phe Leu Val
 465 470 475 480

Gly His Phe Asp Ile Leu Asp Thr Ala Lys Ser Ser Leu Thr Ser Ser
 485 490 495

Gly Tyr Glu Gly Leu Phe Leu Gly Gly Asn Tyr Val Ala Gly Val Ala
 500 505 510

Leu Gly Arg Cys Val Glu Gly Ala Tyr Glu Thr Ala Ile Glu Val Asn
 515 520 525

Asn Phe Met Ser Arg Tyr Ala Tyr Lys
 530 535